

ECTOPARASITES OF MAMMALS AND BIRDS FROM FORT DIX, NEW JERSEY^{1 2}

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ABSTRACT: New state records are detailed for 17 arthropod ectoparasite species collected from mammals and birds at Fort Dix, New Jersey. Thirty-four additional ectoparasitic arthropod species are included in a host-ectoparasite list from a total of 108 hosts of 21 different species.

This study was undertaken to supplement existing knowledge of known or potentially medically important ectoparasitic arthropods at Fort Dix, Burlington County, New Jersey. Presence, prevalence and host range data were sought on ticks, fleas and mites which are known or potential vectors of human pathogens.

Previous records of ectoparasites from New Jersey have been published by: Cooley (1938, 1946), Fox (1940), Trembley and Bishopp (1940), Cooley and Kohls (1944, 1945), Ferris (1951), Hansens and Hadjinicolaou (1952), Baquaert (1954), Burbutis and Hansens (1955), Race (1955), Burbutis (1956), Hansens (1956), Burbutis and Mangold (1956), Clifford, et. al. (1961), Manischewitz (1966), Herrin (1970), and Whitaker and Wilson (1974). Collections from Burlington County were limited in or absent from most of these records.

During 1974, the Health and Environment Activity of the Medical Department Activity, Fort Dix, NJ, conducted a small animal trapping and ectoparasite surveillance program as part of their routine pest surveillance mission.

Most of those 1974 collections are included here. All new state records included herein have been examined and confirmed by taxonomic specialists. Any specimen whose identification was questionable due to condition, preparation artifacts or improper instar for determination, was omitted from these data. No taxon is reported as a new state record if it could not be determined to be such a record. New state records do not include subspecies nor

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taxa determined to genus only (although the latter are included in the host-ectoparasite list in order to reflect their occurrence and observed hosts).

METHODS

Small animals and birds were trapped in box-type live traps, anesthetized, and examined for ectoparasites. Fleas and some immature ticks were mounted in balsam on slides whereas lice and most mites were mounted in Hoyer's medium, ringed with clear fingernail polish. Some mites and late nymphal instars were preserved in 70 percent ethanol. Louse flies were attached with casein glue to paper points. These collections and processing procedures are detailed in Bram (1978). Host animals were identified using Burt and Grossenheider (1964), Peterson (1968) and Blair, et. al. (1968). Arthropod specimens reported here have been deposited in the collections of: the senior author, the Ohio State University (Columbus), the University of Kentucky (Lexington), the University of Minnesota (St. Paul), the California State University (Long Beach), the U.S. Army Academy of Health Sciences (Fort Sam Houston, TX) and the U.S. National Museum.

RESULTS AND DISCUSSION

Ectoparasites were collected from mammals and birds at Fort Dix, Burlington County, New Jersey during 1974. Examination of 108 animals yielded 321 fleas (9 species), 964 biting lice (6 species), 517 sucking lice (7 species), 261 ticks (7 species), 259 mites (20 species), and 5 louse flies (2 species). Seventeen ectoparasite species are reported from New Jersey for the first time.

New state records are detailed below. All other collections are included in the host-ectoparasite list for the purpose of recording their occurrence and observed hosts in the study area. All specimens reported here were collected on the Fort Dix military reservation. Numbers of ectoparasite specimens reported herein should not be used for any quantitative purposes because the investigators did not attempt to collect all the ectoparasites from heavily infested hosts.

Anoplura listed below follow the classification of Stojanovich and Pratt (1965); Mellophaga follow Emerson (1972 a, 1972 b); Siphonaptera follow Hopkins and Rothschild (1953); Acari follow Krantz (1971); Hippoboscidae follow Baquaert (1959); vertebrate hosts follow Blair, et. al. (1968). Parenthetic numbers following host names indicate numbers of infested individuals examined. Life stage abbreviations for ectoparasite specimens include: L = larva(e), N = nymph(s), H = hypopus (hypopi), M = adult male(s), F = adult female(s).

Class: ACARI**Order: PARASITIFORMES****Family: LAELAPIDAE***Eulaelaps stabularis* (Koch)

1 M, 3 F, ex. *Didelphis marsupialis* L., 20-III-1974; 1 M, ex. *D. marsupialis*, 23-IV-1974; 1 M, ex. *Peromyscus leucopus* (Rafinesque), 2-VIII-1974, 4 F, ex. *Rattus norvegicus* (Berkenhout), 26-VI-1974; new state record.

Hirstionyssus staffordi Strandtmann and Hunt

1 N, 3 F, ex. *Mephitis mephitis* (Schreber), 29-III-1974; 2 F, ex. *M. mephitis*, 1-IV-1974; new state record.

Haemogamasus reidi Ewing

1 N, 7 F, ex. *Glaucomys volans* (L.), 18-X-1974; new state record.

Family: MACRONYSSIDAE*Ornithonyssus wernecki* (Fonseca)

3 N, 1 F, ex. *D. marsupialis*, 4-III-1974; 5 F, ex. *D. marsupialis*, 16-III-1974; 2 F, ex. *D. marsupialis*, 20-III-1974; 3 N, ex. *D. marsupialis*, 21-III-1974; new state record.

Order: ACARIFORMES**Family: MYOBIIDAE***Archemyobia inexpectatus* Jameson

2 F, ex. *D. marsupialis*, 16-III-1974; new state record.

Family: LABIDOPHORIDAE*Dermacarus hylandi* Fain

29 H, ex. *Tamias striatus* (L.) (8): 29-III-1974, 19-IV-1974, 5-VI-1974, 27 and 30-VIII-1974 (2), and 26-IX-1974 (2); new state record.

Family: CHEYLETIDAE*Cheyletus eruditus* (Schrank)

1 N, 4 F, ex. *P. leucopus*, 23-IV-1974; new state record.

Family: TROMBICULIDAE*Trombicula fitchi* Loomis

3 L, ex. *G. volans*, 18-X-1974; new state record.

Class: INSECTA**Order: ANOPLURA****Family: HAEMATOPINIDAE***Neohaematopinus sciuropteri* (Osborn)

4 N, 5 F, ex. *G. volans*, 18-X-1974; new state record.

Family: HOPLOPLEURIDAE
Hoplopleura erratica (Osborn)

21 N, 2 F, ex. *T. striatus*, 5-VI-1974; 56 N, 6 M, 11 F, ex. *T. striatus* (2), 30-VIII-1974; 27 N, 3 M, 19 F, ex. *T. striatus*, 12-IX-1974; 18 N, 5 M, 9 F, ex. *T. striatus*, 26-IX-1974; new state record.

Hoplopleura trispinosa Kellogg and Ferris

4 N, 1 M, 8 F, ex. *G. volans*, 18-X-1974; new state record.

Hoplopleura sciuricola Ferris

13 N, 4 M, 6 F, ex. *Sciurus carolinensis* Gmelin, 11-III-1974; 1 N, 1 M, ex. *S. carolinensis*, 18-III-1974; 2 N, 3 M, 12 F, ex. *S. carolinensis*, 15-IV-1974; 4 N, 9 F, ex. *S. carolinensis*, 21-IV-1974; 22 N, 10 F, ex. *S. carolinensis*, 30-IV-1974; new state record.

Order: MALLOPHAGA
Family: TRICHOECTIDAE
Neotrichodectes mephitidis (Packard)

28 N, 39 M, 129 F, ex. *M. mephitis*, 29-III-1974; 41 N, 24 M, 75 F, ex. *M. mephitis*, 1-IV-1974; new state record.

Although geographic records for mallophaga are usually de-emphasized by most experts due to the extreme mobility of their bird hosts, this state record is worthy of note. This becomes readily apparent when one considers that their hosts were collected at least 30 miles from the nearest state border, a skunk's normal lifetime activity range is less than a six mile radius, and they seldom, if ever, migrate (Verts, 1967).

Order: SIPHONAPTERA
Family: PULICIDAE
Pulex simulans Baker

1 M, 4 F, ex. *Canis familiaris* L., 8-XI-1974; new state record.

Smit (1958) resurrected this species from synonymy with *Pulex irritans* L. Many workers since then have accepted and reinforced the validity of *P. simulans* as a separate taxon. Palmer and Wingo (1972) presented a key for separating these two species with supporting illustrations. Wilson (1966) summarized previously known records of *P. simulans* but did not report any records from New Jersey.

Family: RHOPALOPSYLLIDAE
Polygenis gwyni (C. Fox)

1 M, 1 F, ex. *M. mephitis*, 1-IV-1974; 2 M, 5 F, ex. *D. marsupialis*, 23-V-1974; new state record.

Order: DIPTERA
Family: HIPPOBOSCIDAE
Ornithoica vicina (Walker)

1 M, ex. *Lanius excubitor* L., 29-VIII-1974; new state record.

Pseudolynchia canariensis (B. Macquart)

1 M, 3 F, ex. *Columba livia* Gmelin, 7-VI-1974; new state record.

HOST-ECTOPARASITE LIST

Class: AVES

Order: COLUMBIFORMES

Family: COLUMBIDAE

C. livia – domestic pigeon

Campanulotes bidentatus (Burmeister) – M:P*

Columbicola columbae (L.) – M:P

*P. canariensis*** – D:H

Order: PASSERIFORMES

Family: CORVIDAE

Cyanocitta cristata (L.) – blue jay

Brueelia sp. – M:P

Haemaphysalis leporispalustris (Packard) – P:I

Family: EMBERIZIDAE

Pipilo erythrophthalmus (L.) – rufous-sided towhee

H. leporispalustris – P:I

Family: ICTERIDAE

Quiscalus quiscula (L.) – common grackle

Ambloyomma americanum (L.) – P:I

H. leporispalustris – P:I

Myrsidea fuscomarginata (Osborn) – M:M

Tangavius aeneus (Wagler) – bronzed cowbird

Myrsidea thoracica (Giebel) – M:M

Family: LANIIDAE

Lanius excubitor L. – northern shrike

H. leporispalustris – P:I

*O. vicina*** – D:H

*Key to ectoparasite taxa (i.e. Order: Family) in alphabetic order:

A:A = Acariformes:Anystidae, A:Ca = Acariformes:Camisiidae, A:E = Acariformes:Erythraeidae, A:Lab = Acariformes:Labidophoridae, A:My = Acariformes:Myobiidae, A:T = Acariformes:Trombiculidae, AN:H = Anoplura:Haematopinidae, An:Ho = Anoplura:Hoplopleuridae, D:H = Diptera:Hippoboscidae, M:M = Mallophaga:Menoponidae, M:P = Mallophaga:Philopteridae, M:T = Mallophaga:Trichodectidae, P:An = Parasitiformes:Analgidae, P:C = Parasitiformes:Cheyletidae, P:I = Parasitiformes:Ixodidae, P:L = Parasitiformes:Laelapidae, P:M = Parasitiformes:Macronyssidae, S:C = Siphonaptera:Ceratophyllidae, S:H = Siphonaptera:Hystriochopsyllidae, S:P = Siphonaptera:Pulicidae, S:R = Siphonaptera:Rhopalopsyllidae.

**Indicates a new state record.

Family: MIMIDAE*Dumetella carolinensis* (L.) – catbird*Mesalgoides* sp. – P:An**Family: TURDIDAE***Hylocichla mustelina* (Gmelin) – wood thrush*H. leporispalustris* – P:I**Class: MAMMALIA****Order: CARNIVORA****Family: CANIDAE***C. familiaris* – domestic dog*Ctenocephalides felis* (Bouche) – S:P*Dermacentor variabilis* (Say) – P:I*P. simulans*** – S:P*Rhipicephalus sanguineus* (Latreille) – P:I**Family: FELIDAE***Felis catus* L. – domestic cat*Androlaelaps fahrenheitzi* (Berlese) – P:L*C. felis* – S:P*D. variabilis* – P:I**Family: MUSTELIDAE***M. mephitis* – striped skunk*H. staffordi*** – P:L*N. mephitidus*** – M:T*Odontopsyllus multispinosus* (Baker) – S:C*P. gwyni*** – S:R**Family: PROCYONIDAE***Procyon lotor* (L.) – raccoon*A. americanum* – P:I*A. fahrenheitzi* – P:L*C. felis* – S:P*D. variabilis* – P:I*Ixodes texanus* Banks – P:I*O. multispinosus* – S:C*Ornithonyssus bacoti* (Hirst) – P:M**Order: LAGOMORPHA****Family: LEPORIDAE***Sylvilagus floridanus* (J.A. Allen) – Eastern cottontail*A. fahrenheitzi* – P:L*Cediopsylla simplex* (Baker) – S:P*D. variabilis* – P:I*H. leporispalustris* – P:I*Ixodes dentatus* Marx – P:I*Neotrombicula whartoni* (Ewing) – A:T*O. multispinosus* – S:C*Tencateia* sp. – A:A

Order: MARSUPIALIA**Family: DIDELPHIDAE***M. marsupialis* – opossum*A. inexpectatus*** – A:My*Camisia* sp. – A:Ca*C. eruditus*** – P:C*C. felis* – S:P*Ctenophthalmus pseudagyrtes* Baker – S:H*D. variabilis* – P:I*E. stabularis*** – P:L*Laelaps echidnina* Berlese – P:L*O. multispinosus* – S:C*Orchopeas howardii* (Baker) – S:C*Orchopeas leucopus* (Baker) – S:C*O. bacoti* – P:M*O. wernecki*** – P:M*P. gwyni*** – S:R**Order: RODENTIA****Family: CRICETIDAE***P. leucopus* – white-footed mouse*A. fahrenheitzi* – P:L*C. eruditus*** – A:C*E. stabularis*** – P:L*O. leucopus* – S:C*O. bacoti* – P:M*Reithrodontomys humulis* (Audubon and Bachman) – Eastern harvest mouse*Euschoengastia peromysci* (Ewing) – A:T**Family: MURIDAE***R. norvegicus* – Norway rat*C. pseudagyrtes* – S:H*E. stabularis*** – A:L*L. echidnina* – P:L*Polyplax spinulosa* (Burmeister) – An:Ho*Radfordia ensifera* (Poppe) – A:My**Family: SCIURIDAE***G. volans* – Southern flying squirrel*H. reidi*** – P:L*H. trispinosus*** – An:Ho*Miyatomibicula cynos* (Ewing) – A:T*N. sciuropteri*** – An:H*O. howardii* – S:C*T. fitchi*** – A:T*S. carolinensis* – gray squirrel*A. fahrenheitzi* – P:L*D. variabilis* – P:I*H. schiricola*** – An:Ho*Laelaps nuttalli* Hirst – P:L*Neohaematopinus sciuri* Jancke – An:H

- O. howardii* – S:C
Sciurus niger L. – Eastern fox squirrel
L. nuttalli – P:L
Neohaematopinus sciurinus Mjoeberg – An:H
O. howardii – S:C
T. striatus – Eastern chipmunk
Balustium sp. – A:E
C. pseudagyrtes – S:H
*D. hylandi*** – A:Lab
Eptedia weinmanni (Rothschild) – S:H
E. peromysci – A:T
*H. erratica*** – An:Ho
Ixodes scapularis Say – P:I

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LITERATURE CITED

- Baquaert, J.C.** 1954. The Hippoboscidae or louseflies (Diptera) of mammals and birds: Part II: taxonomy, evolution and revision of American genera and species. Entomologica Americana, Vol. XXXIV (N.S.), Business Press, Lancaster, PA, December, 1954, 232 p.
- Blair, W.F., A.P. Blair, P. Brodtkorb, F.R. Cagle and G.A. Moore.** 1968. Vertebrates of the United States, 2 ed., McGraw-Hill Book Co., NY, NY, ix + 616 p.
- Bram, R.A.** 1978. Surveillance and Collection of Arthropods of Veterinary Importance. APHIS Agr. Handbook No. 518; v + 125 p.
- Burbutis, P.P.** 1956. The Siphonaptera of New Jersey. Bull. N.J. Agric. Exper. Sta. No. 782; 36 p.
- Burbutis, P.P., and E.J. Hansens.** 1955. Fleas on rats (*Rattus norvegicus*) in New Jersey. J. N.Y. Entomol. Soc. Vol. 63; pp. 103-106.
- Burbutis, P.P., and R.E. Mangold.** 1956. A study of the fleas of cottontail rabbits in New Jersey. J. Wildlife Management, Vol. 20 (2); April.
- Burt, W.H., and R.P. Grossenheider.** 1964. A field guide to the mammals. Houghton-Mifflin Co., Boston, 284 p.
- Clifford, C.M., G. Anastos, and A. Elbl.** 1961. The larval ixodid ticks of the Eastern United States. Misc. Publ. Ent. Soc. Amer., Vol. 2(3); pp 213-237, May.
- Cooley, R.A.** 1938. The genera *Dermacentor* and *Otocentor* (Ixodidae) in the United States, with studies in variation. N.I.H. Bull. No. 171; 89 p.
- Cooley, R.A.** 1946. The genera *Boophilus*, *Rhipacephalus*, and *Haemaphysalis* (Ixodidae) of the New World. N.I.H. Bull. 187; 54 p.
- Cooley, R.A., and G.M. Kohls.** 1944. The genus *Amblyomma* (Ixodidae) in the United States. J. Parasitol. Vol. 30(2); pp 77-111, April.
- Cooley, R.A., and G.M. Kohls.** 1945. The genus *Ixodes* in North America. N.I.H. Bull. 184; 246 p.

- Emerson, K.C. 1972a). Checklist of the Mallophaga of North America (North of Mexico). Part I. Suborder Ischnocera. Desert Test Center, Dugway Proving Ground, Dugway, Utah.
- _____ 1972b) Part II, Suborder, Amblycera.
- Ferris, G.F. 1951. The Sucking Lice. Vol. 1, Memoirs Pac. Const. Entomol. Soc., San Francisco, CA; ix + 320 p.
- Fox, I. 1968. Fleas of the Eastern United States. Hafner Publ. Co., NY, NY; vii + 191 p. (facsimile of the 1940 ed., Iowa State College Press, Ames, IA).
- Hansens, E.J. 1956. The occurrence of the rat louse (*Polyplax spinulosa*) on the Norway rat in New Jersey. J. N.Y. Entomol. Soc. Vol. 64; pp 95-98.
- Hansens, E.J., and J. Hadjinicolaou. 1952. Preliminary studies of fleas on rats (*Rattus norvegicus*) in New Jersey. J. N.Y. Entomol. Soc., Vol. 60; pp 91-95, June.
- Herrin, C.S. 1970. A systematic revision of the genus *Hirstionyssus* (Acari: Mesostigmata) of the Nearctic region. J. Med. Ent., Vol 7(4); pp 391-437, August.
- Hopkins, G.H.E., and M. Rothschild. 1953. An illustrated catalogue of the Rothschild collection of fleas, Vol. 1, Univ. Press, Cambridge, England; 361 p.
- Krantz, G.W. 1971. A manual of acarology. O.S.U. Book Stores, Inc., Corvallis, OR.
- Manischewitz, J.R. 1966. Studies on parasitic mites of New Jersey. J. N.Y. Entomol. Soc., Vol. 74 (4); pp 189-197, December.
- Palmer, D.B., Jr., and C.W. Wingo. 1972. Siphonaptera occurring on Missouri mammals. Transactions, Mo. Acad. Sci., Vol. 6; pp 43-55.
- Peterson, R.T. 1968. A field guide to the birds, 2 ed., Houghton-Mifflin Co., Boston, 290 p.
- Race, S.R. 1955. The Anoplura or sucking lice of New Jersey. M.S. Thesis, Rutgers Univ., New Brunswick, N.J. (pp 41-44), April, Unpublished.
- Smit, F.G.A.M. 1958. A preliminary note on the occurrence of *Pulex irritans* L. and *Pulex simulans* Baker in North America. J. Parasitol, 44; 523-526.
- Stojanovich, C.J., and H.D. Pratt. 1965. Key to Anoplura of North America. U.S. Publ. Health Svc., Atlanta, GA; 24 p.
- Trembley, H.L. and F.C. Bishopp. 1940. Distribution and hosts of some fleas of economic importance. J. Econ. Ent., Vol. 33; pp 139-140.
- Verts, B.J. 1967. The Biology of the striped skunk. Univ. of Illinois Press, Urbana; vii + 218 p.
- Whitaker, J.O., Jr., and N. Wilson. 1974. Host and distribution lists of mites (Acari), parasitic and phoretic, in the hair of wild mammals of North America, North of Mexico. Am. Midl. Natur., 91 (1); 1-67.
- Wilson, N. 1966. A new host and range extension for *Pulex simulans* Baker with a summary of published records (Siphonaptera: Pulicidae). Am. Midl. Natur., 75: 245-248.